APPENDIX I

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;
;                             TRANSMITTER CODE
;
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base $10

 INCLUDE 'H705J1A.asm'               ; equates for the HC705J1A

; This version is the COUNTER IR interface
; The clock taps the main processor 16/second.
; This version has microprocessor power level selection via pullups.


                org     MOR
                fcb     $A0          ; SHORT OSC DELAY

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;     Equates and RAM Storage
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;     I/O Pin Equates:
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PWRLEVL       equ      0                  ; PA0, POWER LEVEL LOW
CONTROL
PWRLEVM       equ      1                  ; PA0, POWER LEVEL MEDIA
CONTROL
PWRLEVH       equ      2                  ; PA0, POWER LEVEL HIGH
CONTROL
IRDOUT        equ      3                  ; PA3, ir data, output
LED           equ      5                  ; PA5, LED, OUTPUT
RBASE         equ      7                  ; PA7, RESET BASE TIMMING,
OUTPUT

PUHBUT        EQU      2                  ; pb2, PUSH BUTTON INPUT


        org RAM

QUIETMO       RMB      1                  ; QUIET MODE FLAG
PBCTR         RMB      1                  ; PUSH BUTTON DOWN TIMER
HIPOWER       RMB      1                  ; HIGH POWER MODE FLAG
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PSTIMER       RMB      1                ; POWER SELECT TIMER

            org     EPROM                 ; start at the top of EPROM

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

POWER       RSP
            lda   #%01000111              ; set IR output for active
state
            sta   PORTA                   ; release ir data
            lda   #%11110100              ; set IR data output so that
                                          ; IR is off
            sta   ddra                    ; HIGH POWER MODE
            lda   #%01111111              ; disable pulldowns 0-6
            sta   pdra
            TST   QUIETMO                 ; IN QUIET MODE?
            BNE   POWER3

            TST   HIPOWER                 ; IN HIGH POWER MODE
            BNE   POWER0
            BSET  PWRLEVL,DDRA            ; DISABLE HIGH POWER CONTROL
            BSET  PWRLEVH,DDRA

POWER0      lda   #$07                    ; 27 microsec 6*7+5=47
            bclr  irdout,porta
            bset  irdout,ddra             ;[5]
POWER1      deca                          ;[3] 1-CYC=.5747mS.
            bne   POWER1                  ;[3]
            bclr  irdout,ddra             ;[5] ir led OFF

            lda   #$0F                    ;[2] 50 microsec 6*15+2=90
POWER2      deca                          ;[3] 1-CYC=.559mS.
            bne   POWER2                  ;[3]
            bset  RBASE,porta             ; reset the base time

POWER3      BSR   PROCPB                  ; PROCESS THE PISHBUTTON

POWER4      TST   PSTIMER                 ; LED TIMER ACTIVE
            BEQ   POWER5
            BSET  LED,PORTA
            BSET  LED,DDRA
            DEC   PSTIMER
POWER5            stop

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PROCPB      BRCLR PUHBUT,PORTB,PBNOT      ; IS THE PB PUSHED?
            TST   QUIETMO                 ; FLASH LED IF IN QUIET MODE
            BEQ   PROCPB1

            BSET  LED,PORTA               ; LED ON
            BSET  LED,DDRA
            lda   #$FF                    ;[2] 256*18=4608 cyc
PROCPBD     deca                          ;[3]
```

```
            inca                        ;[3]
            deca                        ;[3]
            inca                        ;[3]
            deca                        ;[3]
            bne   PROCPBD               ;[3]
            BCLR  LED,PORTA             ; LED OFF


PROCPB1     LDA   PBCTR                 ; DO NOT GO ABOVE 255
            CMP   #$FF
            BEQ   POWOOS
            INC   PBCTR                 ; BUMP THE PB ACTIVE COUNTER
            LDA   PBCTR                 ; BETWEEN 4 AND 6 SECONDS
            CMP   #$40                  ; LED ON AT 4 SECONDS
            BLO   POWOOS
            LDA   #$50                  ; set LED timer
            STA   PSTIMER
            STA   HIPOWER               ; SET HIGH POWER MODE
            CLR   QUIETMO               ; EXIT QUIET MODE
            BSET  LED,PORTA             ; LED ON
            BSET  LED,DDRA
            LDA   PBCTR                 ; LED OFF AT 6 SECONDS
            CMP   #$60
            BLO   POWOOS
            BCLR  LED,PORTA
            CLR   PSTIMER               ; NO LED TIME IN LOW POWER
MODE
            CLR   HIPOWER               ; SET LOW POWER MODE
POWOOS            RTS

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PBNOT       LDA   PBCTR                 ; ENTRY INTO QUIET MODE?
            CMP   #$40                  ; >2 SECONDS, EXIT/ENTER
QUIET MODE
            BLO   PBNOT1
            CMP   #$A0                  ; >10 SECONDS DOWN?
            BLO   PBNOT2
            LDA   #1                    ; SET QUIET MODE
            STA   QUIETMO
PBNOT1      CLR   PBCTR                 ; CLEAR THE PB DOWN COUNTER
            RTS
PBNOT2      CLR   QUIETMO               ; EXIT QUIET MODE
            BRA   PBNOT1

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;;; reset vectors:

                 org     $07f8
                 fdb     POWER
                 fdb     POWER
                 fdb     POWER
                 fdb     POWER
                 end
```

APPENDIX II

```
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;
;                               RECEIVER CODE
;
;                    COPYRIGHT © POINT SIX WIRELESS, LLC 2002
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 base $10

 INCLUDE 'H705J1A.asm'             ; equates for the HC705J1A

; This is the Standard version seed = $0000
; This version is the COUNTER IR receiver/418 transmitter
; The clock taps the main processor 16/second.
; The xtal is 4 Mhz.


ID           EQU   $11                ; COUNTER ACCUMULATOR
SID          EQU   $10                ; SERVICE ID
XMPERIOD     EQU   $0A                ; transmitt period = 10 seconds
SEEDMSB      EQU   $00                ; MSBYTE SEED FOR POINT SIX
                                      ; STANDARD
SEEDLSB      EQU   $00                ; LSBYTE SEED FOR POINT SIX
                                      ; STANDARD




                org     MOR
                fcb     $A0           ; SHORT OSC DELAY

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;        Equates and RAM Storage
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; I/O Pin Equates:
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TPS            equu     $10           ; 16 ticks/second

IRPWR          equ      0             ; PA0, IRPOWER, output
LCDCLR         equ      1             ; PA1, LCD CLR, OUTPUT
LED            equ      2             ; PA2, LED DRIVE ACTIVVE HIGH,
                                      ; OUTPUT
```

```
IRIN          equu     3            ; PA3, ir data, INPUT
LCDCTR        equ      4            ; PA4, LCD CTR, output
SPARE5        equ      5            ; PA5, SPARE, OUTPUT
radio         equ      6            ; PA6, radio transmit data, OUTPUT
RBASE         equ      7            ; PA7, RESET BASE TIMER, OUTPUT

PUHBUT        equ      2            ; PB2, PUSHBUTTON INPUT
SPAREB3       equ      3            ; PB3, SPARE, OUTPUT

OSWITCH       equ      0            ; open-door status bit in STATUS
CSWITCH       equ      1            ; close-door status bit in STATUS


        org RAM

BYCT          RMB      2            ; BYTE COUNT
CHAR          RMB      1            ; CHARACTER STORE FOR SERIAL DATA
TEMPA         RMB      2            ; TEMP STORAGE
SECOND        RMB      1            ; second sub counter
SUBCTR        RMB      1            ; SUB COUNTER
STATUS        RMB      1            ; STATUS BITS 0,1
PBCTR         RMB      1            ; PUSH BUTTON DOWN COUNTER
SETUPMOD      RMB      1            ; TEST MODE FLAG
SETUPTIM      RMB      1            ; SETUP TIMER
HOLDOFF       RMB      1            ; TRANSMISSION HOLDOFF
XPEND         RMB      1            ; XMIT PENDING
MISSED        RMB      1            ; MISSED IR RECEPTION ON
                                    ; LAST CYCLE FLA
MULBLOCK      RMB      1            ; MULTIPLYER FOR BLOCKED TIMER
SERVICE       RMB      1            ; SERVICE
QUIETMO       RMB      1            ; QUIET MODE FLAG, 1=NO
                                    ; TRANSMISSIONS
TOTMSEC       RMB      1            ; TOTAL MISSED SECONDS COUNTER
LVALID        RMB      1            ; LAST PULSE WAS A VALID PULSE
ALLRSYN       RMB      1            ; ALLOW-RESYNC-ATTEMPT FLAG
LOOKTIME      RMB      1            ; LOOK FOR PULSE TIMER
REPEAT        RMB      1            ; REPEAT ON NEXT SECOND

;;;;;;; THIS IS THE START OF THE TRANSMITT DATA PACKET
TYPEID        RMB      1            ; TYPE ID FIELD
SHORTSN       RMB      4            ; SHORT SERIAL NUMBER THIRTY BITS
CYCOPEN       RMB      3            ; COUNTER FOR OPEN SWITCH
TOTMISS       RMB      3            ; COUNTER FOR OUT OF SYNC
WWCRC         RMB      2            ; CRC16
;;;;;;; THIS IS THE END OF THE TRANSMITT DATA PACKET

WWBYCT        RMB      1            ; BYTE COUNT
TTIME         RMB      1            ; TRANSMITT CELL TIME
NODE          RMB      1            ;
RANDOML       RMB      1            ; RANDON COUNTER
RETRYX        RMB      1            ; 10 SECOND RETRY TRANSMITTER

      org     EPROM                 ; start at the top of EPROM

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SERIAL        FCB  $30,$10,$20,$00  ; SERIAL NUMBER

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POWER        RSP
             bclr  irqe,iscr          ; disable external int
             lda   #%00100001         ; ON THE TSOP700
             sta   PORTA              ;
             lda   #%11100101         ;[2]
             sta   ddra               ;[4]
             lda   #%11111111         ;[2] DISABLE PULL DOWNS.
             sta   pdra               ;[4]
             bset  irqr,iscr          ;[3] clear the irq
             lda   #$00               ;[2] LOW OUTPUTS
             sta   PORTB              ;[4]
             lda   #$08               ;[2] PB2 IS AN INPUT
             sta   ddrb               ;[4]
             lda   #$00               ;[2] Enable pulldowns ON PORTB
             sta   pdrb               ;[4]
             TST   QUIETMO            ;[4] TEST FOR QUIET MODE
             BNE   POWER1             ;[3]
             LDA   LVALID             ;[3]
             CLR   LVALID             ;[4] LAST PULSE INVALID BY DEFAULT
             TSTA                     ;[3]
             BNE   PULSE              ;[3] YES, PULSE ANOTHER
             TST   ALLRSYN            ;[4] RESYNC ATTEMPT ALLOWED
             BNE   RESYNC             ;[3] 53 CYC
             JSR   MTOTAL             ; TOTAL THE MISS
             BRA   SLEEP
POWER1       DEC   QUIETMO            ; GET THE FLAG/TIMER
             BNE   SLEEP              ; BUMP IT TOWARD ZERO
             LDA   #TPS               ; RESET THE TIMER/FLAG
             STA   QUIETMO            ; FOR 1 SECOND LCD TICK
             BCLR  LCDCTR,PORTA       ; COUNT THE TICK
             BSET  LCDCTR,DDRA        ; ON THE LCD
             BRA   SLEEP

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RESYNC       LDA   #$08               ;[2] + 53-cyc sense ir sense on
RESYNC1      DECA                     ;[3] MUST NOT TEST FOR 50MS,
                                      ;    100 CYC
             BNE   RESYNC1            ;[3] 53+N*6=100, N=8

RESYNC2      LDA   #$FF               ;[2]
             STA   LOOKTIME           ;[4] CLEAR THE OVERALL LOOK TIMER
RESYNC3      BRCLR IRIN,PORTA,IRVT    ;[5] HIT OR TIMEOUT!
             DEC   LOOKTIME           ;[5] MOVE THE LOOK TIMER
             BNE   RESYNC3            ;[3] (7.5)*256=1920 CYC, 1 MILLI

             JSR   NOWOP              ; BEAM PATH IS NOW OPEN
             JSR   MTOTAL             ; TOTAL THE MISS
             JSR   CYCEND             ; DO THE CYCLE END STUFF
             TST   SETUPMOD           ; RESET THE SETUP TIMER
```

```
            BEQ   RESYNC4           ; IF IN SETUP MODE
            LDA   #$FF
            STA   SETUPMOD
RESYNC4     BRSET IRIN,PORTA,RESYNC4; HIT OR TIMEOUT!
            BRA   IRVT

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PULSE       LDA   #$09              ;[2] 2+ 46-cyc sense ir sense on
PULSE1      DECA                    ;[3] MUST NOT TEST FOR 50MS, 100
                                    ;    CYC
            BNE   PULSE1            ;[3] 48+N*6=100, N=9

            LDA   #$07              ;[3] THEN LOOK FOR LOW WITHIN 50
                                    ;    MS.
PULSEX      BRCLR IRIN,PORTA,IRVT   ;[5] POSSIBLE HIT OR TIMEOUT!
            INC   RANDOML           ;[5] RANDOMIZE
            DECA                    ;[3]
            BNE   PULSEX            ;[3] 16*N=100, N=7
            BRA   INVALID

IRVT        LDA   #$09              ;[2] MUST GO HIGH AGAIN WITHIN 50MS
IRVTL       BRSET IRIN,PORTA,IRVALID;[5] AFTER GOING LOW
            DECA                    ;[3]
            BNE   IRVTL             ;[3] 2+11*N=100CYC, N=9
INVALID     BRA   RESYNC2           ; ATTEMPT TO RESYNC.

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IRVALID     BSET  RBASE,PORTA       ; RESET TIMEBASE, NOW IS 0 TIME
            BCLR  IRPWR,DDRA        ; POWER DOWN THE SENSOR
IRHIT       TST   MISSED            ; THE PATH IS CLOSED ONLY IF
            BNE   IRHIT2            ; THE LAST PULSE WAS ALSO VALID
            TST   SETUPMOD          ; TEST MODE?
            BEQ   IRHIT1
            BSET  LED,PORTA         ; FLASH THE LED IN TEST MODE
            BSET  LED,DDRA
            DEC   SETUPMOD          ; COUNT THE FLASH
IRHIT1      JSR   NOWCL             ; BEAM PATH IS NOW CLOSED
IRHIT2      CLR   MISSED            ; CLEAR THE MISS CTR
            CLR   MULBLOCK          ; AND THE MULTIPLYER FOR BLOCKED
            LDA   #1                ; SET PULSE VALID
            STA   LVALID
            BRA   SLEEP

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SLEEP       BSR   CYCEND            ; DO THE CYCLE END STUFF
            BCLR  RADIO,PORTA       ; RADIO OFF
            BCLR  IRPWR,DDRA        ; ir sub system off
            BSET  irqr,iscr         ; clear the irq
            STOP

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CYCEND      LDA   SECOND           ; SUB SECOND COUNTER
            BEQ   CYCENDRL         ; EXPIRED SECOND, RELOAD
            DECA
            STA   SECOND
            TST   SERVICE          ; TRANSMIT SERVICE NOW
            BNE   CYCENDXM
            TST   SECOND
            BNE   CYCENDS

            TST   SETUPTIM         ; SETUP TIMER RUNNING?
            BEQ   CYCENDRL
            DEC   SETUPTIM
            BNE   CYCENDRL
            CLR   SETUPMOD         ; EXIT SETUP MODE, TIMEOUT
CYCENDRL    LDA   #TPS             ; SET  TICKS/SEC
            STA   SECOND
            LDA   SUBCTR           ; SUB INTERVAL COUNTER
            DECA
            AND   #$3F
            STA   SUBCTR
            BNE   CYCEND1
            LDA   RANDOML          ; RANDOMIZE
            LDX   RANDOML
            EOR   POWER,X
            AND   #$07
            ADD   #XMPERIOD        ; ADD LSBIT TO TRANSMITT PERIOD
            STA   SUBCTR           ; RANDOM 0-7 SECOND SLIP OF
                                   ; INTERVAL
            STA   XPEND
CYCEND1     TST   SERVICE          ; TRANSMIT SERVICE NOW
            BNE   CYCENDXM
            TST   REPEAT           ; REPEAT PACKET?
            BEQ   CYCEND2
            CLR   REPEAT           ; KILL REPEAT FLAG
            BRA   CYCENDXM         ; TRANSMIT AGAIN
CYCEND2     TST   HOLDOFF          ; HOLDOFF TIMER
            BEQ   CYCEND3
            DEC   HOLDOFF
            BNE   CYCENDS
CYCEND3     LDA   XPEND            ; XMIT PENDING?
            BEQ   CYCENDS          ; NO.
            STA   REPEAT           ; SET TO REPEAT
CYCENDXM    TST   QUIETMO          ; DO NOT TRANSMITT IN QUIET MODE
            BNE   CYCENDNX
            JSR   XPACKET          ; TRANSMIT PACKET
CYCENDNX    CLR   XPEND            ; CLEAR PENDING FLAG
            LDA   #$0A             ; HOLD OFF FOR 10 SECONDS
            STA   HOLDOFF          ; THE NEXT TRANSMISSION
            TST   RETRYX           ; RETRYS REMAINING?
            BEQ   CYCENDS
            DEC   RETRYX
            LDA   #$0A             ; SET 10 SECOND RETRY XMIT TIMER
            STA   SUBCTR
CYCENDS     JSR   PROCPB           ; PROCESS THE PUSH BUTTON
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CYCENDSS    RTS

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NOWCL       BCLR  OSWITCH,STATUS    ; "CLOSED", CLEAR THE OPEN STATUS
            BRSET CSWITCH,STATUS,NOWOPE  ; IS IT NEW?
            BSET  CSWITCH,STATUS    ; "NEW" SET THE CLOSED STATUS
            BRA   XPRETRY           ; CAUSE A TRANSMISSION
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;


NOWOP       BCLR  CSWITCH,STATUS    ; "OPEN", CLEAR THE CLOSED STATUS
            BRSET OSWITCH,STATUS,NOWOPE
            BSET  OSWITCH,STATUS    ; NEW, SET THE "OPEN" STATUS
            BCLR  LCDCTR,PORTA      ; COUNT THE HIT
            BSET  LCDCTR,DDRA       ;
            INC   CYCOPEN           ; COUNT THE ACTIVE STATE
            BNE   XPSETLED          ; TRANSMIT DATA
            INC   CYCOPEN+1
            BNE   XPSETLED          ; TRANSMIT DATA
            INC   CYCOPEN+2
XPSETLED    BSET  LED,PORTA         ; FLASH THE LED
            BSET  LED,DDRA          ;
XPRETRY     LDA   #3                ; SEND THREE MORE AT 10 SEC PERIOD
            STA   RETRYX
            LDA   #1                ; SET THE XMIT PENDING FLAG
            STA   XPEND             ; TO ENABLE TRANSMIT DATA
NOWOPE      RTS

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MTOTAL      INC   TOTMSEC           ; SUB SECOND COUNTER
            LDA   TOTMSEC
            CMP   #TPS              ; TICKS PER SEDOND
            BLO   MTOTAL1
            CLR   TOTMSEC
            INC   TOTMISS           ; BUMP TOTALS, 8 HRS=007080h
            BNE   MTOTAL1
            INC   TOTMISS+1         ; 256 SEC/COUNT
            BNE   MTOTAL1
            INC   TOTMISS+2         ; 65536 SECONDS/COUNT, 1=18.2 HRS
MTOTAL1     INC   MISSED            ; NOT MAXED, BUMP IT.
            LDA   MISSED            ; GET THE MISSED COUNTER
            CMP   #$E8              ; ACT NORMAL FOR 232-CYC BLOCKED
            BLO   MTOTALM           ; INDICATE WINDOW HERE
            CMP   #$FF              ; (255-232)CYC, REPEAT OPEN WINDOW
            BLO   MTOTALB           ; BLOCK RESYNC ATTEMPT UNTIL WINDOW
            LDA   #$E8              ; YES,SET BACK TO 15 SEC POINT
            STA   MISSED            ; TEST FOR RESYNC EVERY 1.5*4 SEC
            INC   MULBLOCK          ; INCREMENT THE MULTIPLYER
            LDA   MULBLOCK
            CMP   #$04
            BLO   MTOTALB           ; BLOCK RESYNC ATTEMPT ON NEXT CYC
            CLR   MULBLOCK
MTOTALM     LDA   #1                ; ALLOW RESYNC ATTEMPT ON NEXT CYC
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            STA   ALLRSYN
            RTS
MTOTALB     CLR   ALLRSYN           ; BLOCK RESYNC ON NEXT CYCLE
            RTS

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PROCPB      BRCLR PUHBUT,PORTB,PBNOT; IS THE PB PUSHED?
            LDA   PBCTR             ; DO NOT GO ABOVE 255
            CMP   #$FF
            BEQ   POWOOS
            INC   PBCTR             ; BUMP THE PB ACTIVE COUNTER
            LDA   PBCTR             ; IF >4 SECONDS, CLEAR LCD CTR
            CMP   #$40
            BEQ   PROCPB1           ; SET CLEAR LCD/COUNT MODE
POWOOS      RTS

PROCPB1     BCLR  LCDCLR,PORTA      ; SET THE LCD CLEAR LOW
            BSET  LCDCLR,DDRA
            CLR   CYCOPEN
            CLR   CYCOPEN+1
            CLR   CYCOPEN+2
            CLR   TOTMSEC
            CLR   TOTMISS           ; CLEAR THE TOTAL MISSED COUNTER
            CLR   TOTMISS+1
            CLR   TOTMISS+2
            CLR   SETUPMOD          ; CLEAR THE SETUP MODE
            CLR   SETUPTIM
            CLR   QUIETMO           ; EXIT QUIET MODE
            RTS

PBNOT       LDA   PBCTR             ; SET TEST MODE ON PB UP
            CMP   #1                ; COUNT MUST BE ABOVE 1
            BLS   PBNOTC
            CLR   SETUPMOD          ; CLEAR THE SETUP MODE
            CLR   SETUPTIM
            CMP   #$28              ; IF LCD CLEAR DO NOT ENTER TEST
            BHS   PBNOTCQ           ; OR IF SERVICE MODE
            LDA   #1                ; SET SERVICE MODE
            STA   SERVICE
            LDA   #$80              ; SET TEST MODE TIMER/STATUS
            STA   SETUPMOD          ; HITS REQUIRED TO EXIT SETUP MODE
            LDA   #$3C              ; 120 SECOND MAX TIME FOR SETUP
            STA   SETUPTIM
            CLR   MISSED            ; CLEAR THE MISS CTR
            CLR   MULBLOCK          ; AND THE MULTIPLYER FOR BLOCKED
PBNOTC      CLR   PBCTR             ; CLEAR THE PB DOWN COUNTER
            RTS
PBNOTCQ     CMP   #$80              ; 8 SECONDS PUSHED?
            BLO   PBNOTC
            LDA   #TPS              ; SETUP FOR 1/SEC COUNT
            STA   QUIETMO           ; SET QUIET MODE
            BRA   PBNOTC

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XPACKET     LDA   SERIAL            ; GET THE SERIAL NUMBER
            STA   SHORTSN
            LDA   SERIAL+1
            STA   SHORTSN+1
            LDA   SERIAL+2
            STA   SHORTSN+2
            LDA   SERIAL+3
            AND   #$FC
            STA   SHORTSN+3
            LDA   MISSED            ; GET THE MISSED COUNTER
            CMP   #$E8              ; BLOCKED?
            BHS   XPACKBK
            LDA   STATUS            ; GET THE STATUS INPUTS
            AND   #$03              ; MASK THE STATUS
            ORA   SHORTSN+3
            STA   SHORTSN+3

XPACKBK     LDA   #ID               ; SET THE TYPE FIELD
            STA   TYPEID
            TST   SERVICE           ; SERVICE MODE?
            BEQ   RWAVES
            LDA   #SID              ; GET SERVICE ID
            STA   TYPEID
            CLR   SERVICE
RWAVES      BSR   WRCCAL            ; CALCULATE CRC 16 OF DATA
RWAVE       LDA   #$0D              ; SEND BLKSIZE+2 BYTES
            STA   WWBYCT
            LDX   #TYPEID           ; point to ID,data
RWAVEX      BSET  radio,PORTA       ; RADIO ON FOR 1000 MICROSEC
            LDA   #$A7              ; 12*N=2000 CYCLES, N=167
RWAVEI      DECA                    ;[3]
            INCA                    ;[3]
            DECA                    ;[3]
            BNE   RWAVEI            ;[3]
RWAVE1      BSR   Putchar           ;[6]
            INCX                    ;[3]
            DEC   WWBYCT            ;[3] BYTE COUNT IMAGE
            BNE   RWAVE1            ;[3] 15 CYCLES OF OVERHEAD
                                    ; INTRABYTE
            BCLR  RADIO,PORTA       ; RADIO OFF
            RTS                     ;

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WRCCAL      LDA   #SEEDLSB          ; SEED LSB
            STA     WWCRC+1         ; SEED THE CRC
            LDA   #SEEDMSB          ; SEED MSB
            STA     WWCRC
            LDA     #$0B            ; BYTES TO CRC
            STA     WWBYCT
            LDX     #TYPEID         ; POINT TO DATA RECORD
WRCCAL0     LDA     ,X
            INCX
```

```
WRCBYT      EOR     WWCRC+1         ; EOR DATA WITH CRC LSB
            STA     WWCRC+1
            LDA     #8              ; SET 8 BIT COUNTER
            STA     Node
WRCCAL1     LSR     WWCRC           ; SHIFT IT RIGHT ONE PLACE
            ROR     WWCRC+1
            BCC     WRCCAL2
            LDA     WWCRC
            EOR     #$A0
            STA     WWCRC
            LDA     WWCRC+1
            EOR     #$01
            STA     WWCRC+1
WRCCAL2     DEC     Node
            BNE     WRCCAL1

            DEC     WWBYCT
            BNE     WRCCAL0
            LDA     WWCRC           ; REVERSE LSB/MSB
            COMA
            STA     WWBYCT
            LDA     WWCRC+1
            COMA
            STA     WWCRC
            LDA     WWBYCT
            STA     WWCRC+1
            RTS


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;;; reset vectors:
;                 org     Timer_INT
;
;                 fdb     Timer_SVR
;
;
;
;                 org     IRQ_INT
;
;                 fdb     IRQ_SVR
;
;
;
;                 org     SWI_INT
;
;                 fdb     SWI_SVR
;
;
;
;                 org     RESET
;
;                 fdb     Start
;
```

```
org     $07f8
fdb     POWER
fdb     POWER
fdb     POWER
fdb     POWER

end
```